

STUDIES IN AUSTRALIAN AQUATIC HEMIPTERA

No. 1.

By HERBERT M. HALE, SOUTH AUSTRALIAN MUSEUM.

FAMILY CORIXIDAE

Text figs. 338-350.

THE Corixidae, popularly known as water-boatmen, differ considerably from all other Cryptocerata. The head (fig. 338A), which is about as wide as the thorax, is obliquely recurved below, the apex reaching to between the anterior coxae; the mouth is very short, flattened, and the aperture through which the setaceous mouth parts are protruded is situated above the tip of the clypeus. The eyes are large and widely separated and the hinder margin overlaps the prothorax. Each pair of legs is of different form and utility. The anterior members are short. In *Corixa* and sub-genera the tarsus or pala is extremely modified, particularly in the male, and varies in shape in the different species: it consists of a single scoop-like joint, and seen sideways is generally falcate or cultrate (fig. 338B); the lower margin is furnished with two rows of bristly hairs, in one of which rows the hairs are very long. On the inner surface of the male pala are one or more rows of chitinous teeth or pegs, and it is considered that the characteristic stridulation beneath the water is produced by rubbing this tarsal comb across an area, also covered with tiny pegs, and situated near the base of the opposite femur. As pointed out by Kirkaldy⁽¹⁾ and others, the number of pegs in the comb affords a useful distinguishing specific character.

In *Micronecta* the pala of the male terminates in a large flattened claw (fig. 346), which in the female is represented by a stiff seta.

The middle legs are long and attenuated and each terminates in two slender claws; the posterior tarsus is flattened, broadened, and fringed with long hairs.

The life colouration is a little variable, immature imagos being usually paler. After death some changes are apparent: irregular infuscations, having no relation to the general colour scheme, sometimes appear; in the descriptions no note is made of inconstant and irrelevant staining: in specimens not fully adult the colour becomes yet paler, while the external parts may shrivel so that the relative proportions are destroyed.

(1) Kirkaldy, Journ. Quekett Micro. Club (2), viii, 1901, p. 35 (Bibliography) and Proc. Hawaiian Ent. Soc., i, 1906, p. 15.

The odour which is characteristic of Heteropterous bugs generally is noticeable, but not pronounced, in members of this family.

Habits. With the aid of the oar-like hind-legs the Corixidae propel themselves rapidly through the water, or anchor themselves to aquatic plants or other submerged objects by means of the long intermediate tarsal claws; a copious supply of air is carried under water, and the insects remain below the surface for long periods. Living animal food is captured with the anterior legs, with which prey is firmly grasped while the nutriment is extracted. Professor H. B. Hungerford⁽²⁾ states that they are largely herbivorous, and under his observation a species subsisted throughout the life cycle upon the brown sedimentary material which occurs on the bottoms of pools. In 1873 F. B. White⁽³⁾ wrote: "On examining a stone from which a *Corixa* had apparently been obtaining food, a

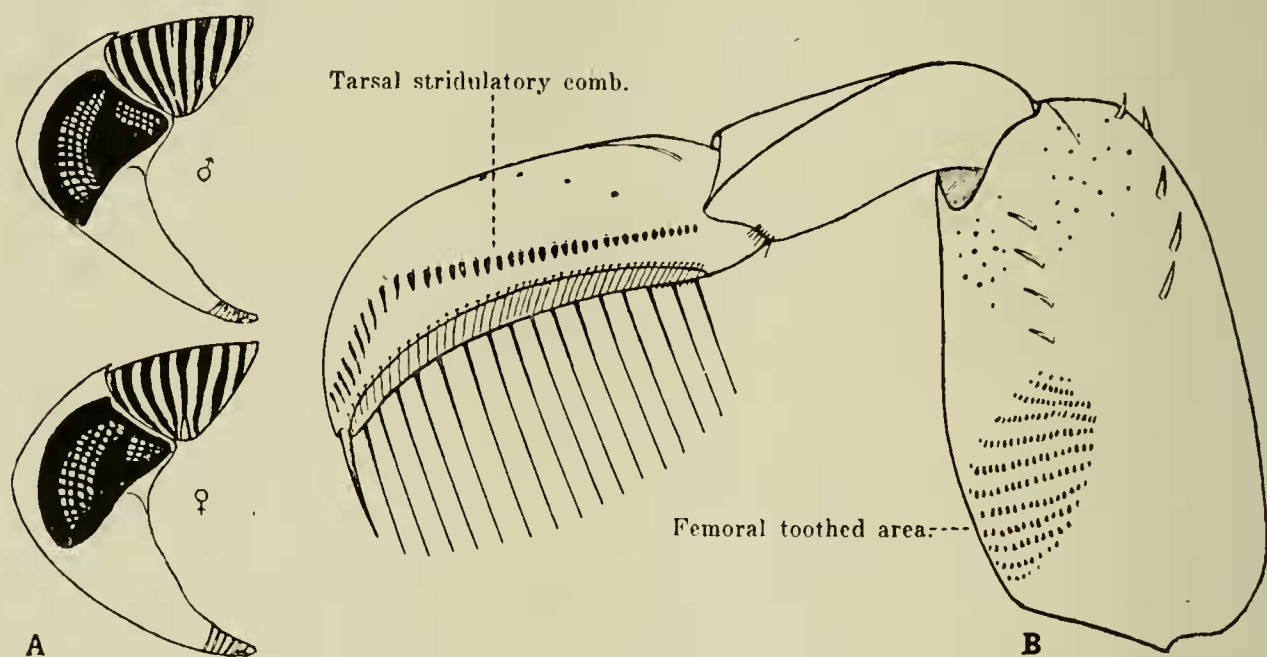


Fig. 338. *Arctocorisa australis*; A, profile of head; B, anterior leg of male.

small *Alga* and a few *Rotifera* and other animalcules were seen." The Indian *Micronecta striata*⁽⁴⁾ (*Corixa ovivora* Westwood) is reported to feed upon the eggs of fishes.

For months I kept in aquaria several species of Corixidae, as well as members of Notonectidae and Nancoridae, and during that time they were fed only upon larvae of *Culex fatigans* and *Scutomyia notoscripta*. Even newly-hatched Corixidae were observed to capture tiny mosquito larvae, increasingly large examples being taken during the successive stages of the metamorphosis. If, as

(2) Hungerford, Science, n.s., xlv, 1917, p. 336.

(3) White, Ent. Month. Mag., x, 1873, p. 79.

(4) Westwood, Proc. Ent. Soc., 1871, p. iv.

seems certain, aquatic bugs feed upon these larvae in their native ponds, there is every reason to suppose that they mitigate the mosquito nuisance, and are thus of considerable economic importance. The malaria-carrying mosquitoes particularly, breed in isolated pools and temporarily inundated grass-grown hollows, localities in which fishes do not usually occur, but to which aquatic bugs, possessing the power of flight, have easy access.

Reproduction. Excepting in *Diaprepocoris*, the sexes are easily distinguished, the structure of the pala alone being sufficient indication. The abdomen of the female is symmetrical, while in that of the male the segments are irregular and distorted (fig. 339A). The male is often also provided with a curious organ, situated on the sixth segment of the upper side of the abdomen. This was discovered by F. B. White⁽⁵⁾ and designated the strigil or strigiliform process. It consists of a somewhat convex disc mounted on a pedicel, and composed of overlapping, striated, chitinous plates, the striae being directed inwards (fig. 345s):

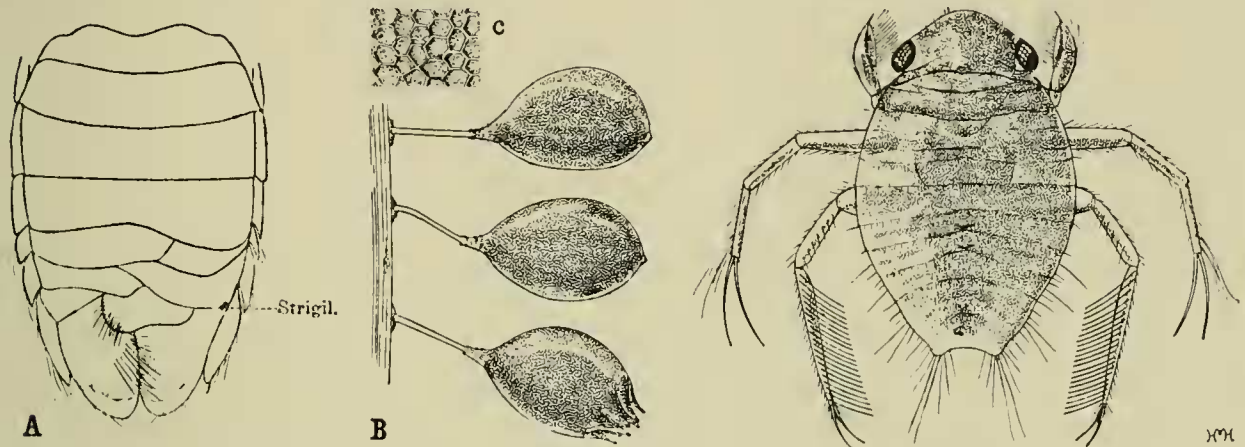


Fig. 339. *Porocorixa eurynome*; A, upper side of abdomen of male; B, eggs and larva, probably of this species.

the utility of this structure is not clear, but it has been suggested that it constitutes portion of a secondary stridulatory apparatus, possibly used during flight. In the hitherto unknown male of *Diaprepocoris* there is yet another form of abdominal apparatus, also apparently stridulatory (fig. 350s).

Although a species may vary in size in different localities, the females are, as a rule, slightly larger than the males.

Fig. 339B shows the eggs and newly-hatched larva of an Australian species, probably *Porocorixa eurynome*. In autumn (April) 1921, numbers of the ova were deposited on the thicker stems of a water-plant (*Potamogeton* sp.) in the Torrens River, Adelaide; the smooth stems of a grass overhanging the banks, and in places submerged, were also utilized, but the ova were always attached to

(5) White, *loc. cit.*, p. 60.

vegetation shallowly situated in the slowly running stream. The eggs are about 1.0 mm. in length, irregularly oval in shape, and somewhat flattened on one side; the micropyle is situated in a nipple at the apex; the surface is minutely wrinkled and is marked with a rather uneven, tiny, reticulating pattern, consisting mostly of hexagons, but with occasionally a five-sided figure interposed (*c*). Each egg is borne on a translucent, thread-like pedicel connected to a disc, which is firmly attached to a plant stem. The pedicel, notwithstanding its fragile appearance, is extraordinarily strong, flexible, and elastic; on being stretched to about four times its normal length it readily returns when released. If sufficient force is used to drag the egg from the object to which it is connected, the disc usually becomes detached, but the connecting pedicel rarely breaks.

As development proceeds the eyes of the enclosed embryo become increasingly visible on each side, at about the apical third of the egg-case; seen through the semi-transparent chitin they appear reniform and of a castaneous colour. In hatching, the larva bursts open the top of the egg-case, the apex being split into several teeth. The newly-emerged bug is 2.5 mm. in length and, excepting for the eyes, is almost transparent, with very faint traces of pigment. The compound eyes are small and consist of comparatively few facets, the interocular space being much wider than in the adult. The posterior tarsus is provided with two terminal claws, and throughout the immature stages is monomerous.

In an aquarium the late pupal stage was attained five months after hatching, when the bugs unfortunately perished before the identity of the species could with certainty be established.

The Corixidae are of almost world-wide distribution. Six species have hitherto been recorded from Australia, five of these being named by Kirkaldy and one by Fieber. Eight additions are herein recorded, some of which have a wide range over the continent; the types are deposited in the South Australian Museum. Several species are often associated in the same situation, and recently a single pool near Adelaide yielded eight of those enumerated in this paper. A single specimen only has been received from Western Australia; more must, of course, occur there, and doubtless further species remain to be recorded from this and other States. In 1893 Skuse⁽⁶⁾ wrote: "Three species of *Corixa* common in the ponds about Sydney," and "Two species, rather abundant," of *Sigara* (*Micronecta*). No other paper dealing with the Cryptocerata has been published in Australia.

I here express my thanks to Mr. W. W. Froggatt, of the Agricultural Department, Sydney, and to the Directors of the Australian Museum, Sydney, and National Museum, Melbourne, for the opportunity of examining the Corixidae preserved in these institutions.

KEY TO THE AUSTRALIAN GENERA.

- a. Scutellum almost or entirely concealed *Corixa* and sub-genera
 - b. Pronotum and hemelytra more or less
rastrate; pronotum with transverse
markings *Arctocorisa*
 - bb. Pronotum and hemelytra densely punc-
tured; pronotum without transverse
markings *Porocorixa* subg. nov.
- aa. Scutellum not concealed.
 - c. Scutellum small; antennae three-jointed . . . *Micronecta*
 - cc. Scutellum large; antennae four-jointed . . . *Diaprepocoris*

CORIXA Geoffroy.**Sub-genus ARCTOCORISA** Wallengren.

Arctocorisa Walleng., Ent. Tidskr., xv, 1894, p. 159.

Basileocorixa Kirk., Entomologist, 1898, p. 253.

Type, *A. variegata* Walleng.

May be separated from other sub-genera of *Corixa* by the following characters: Face excavated in male, convex in female. Palal comb composed wholly of strong chitinous pegs, none being bristle-like. Pronotum more or less rastrate and with transverse lineations. Hemelytra with vermiculate markings. A strigil present on the right side of abdomen of male.

ARCTOCORISA AUSTRALIS Fieber.

Corixa australis Fieber, Abhand. der königl. böhm. Ges. der Wiss. (5), vii, 1852, p. 232, pl. i, fig. 15; Kirk., Ann. Mag. Nat. Hist. (6), xx, 1897, p. 55.

♂ Head ochraceous, prominent, longer than its width at base between eyes, evenly rounded in front; a longitudinal median carina, slightly produced at basal

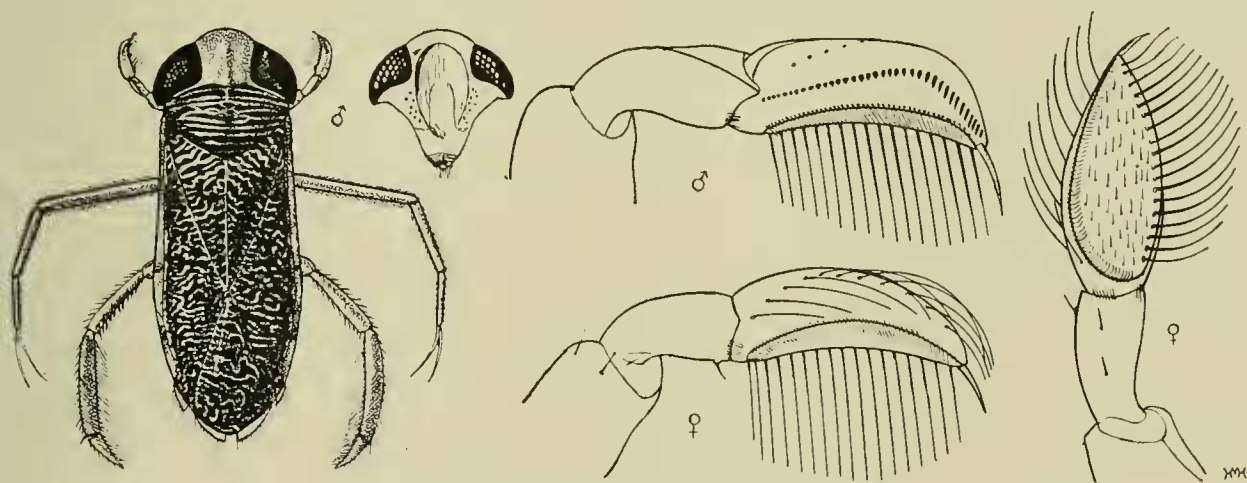


Fig. 340. *Arctocorisa australis*.

margin of head and with an impressed line of punctures on each side and another near the eye; facial impression obovate, large and deep, extending almost to the vertex, clothed with fine pale hairs; eyes directed moderately backwards, beyond and over the anterior pronotal angles, inner margins a little divergent. Pronotum black, crossed by seven to ten narrow, irregular yellow lines; twice as broad between humeral angles as medial length; rastrate and with a median carina, most distinct anteriorly; posterior margin angularly convex, lateral margins short; angles obtuse. Hemelytra black, marked with yellow, sparsely clothed with long, fine, yellow hairs; clavus with sub-transverse, oblique, angularly-wavy lines, the anterior ones broader, so that the base of the clavus appears paler; finely rastrate; corium with angular, interrupted and somewhat transverse lines; a broken yellow line sub-marginal to the costal edge; membrane with transverse lines, twisted on the disc, parallel on the inner margin; embolium dull, pale livid, darkest anteriorly. Sternum ochraceous, in parts black; xyphus blackish, acute; underside of abdomen pale testaceous, darkened anteriorly; connexivum pale yellow; strigil of comparatively large size, sub-rectangular, with four to six broad rows of striae; legs ochraceous; anterior tibiae stout, about four-fifths as long as palae, which are cultrate, the upper margin almost straight for a great part of its length, suddenly bent downwards and forwards to apex; claw long, stout; thirty-six to forty stridulatory pegs in a single row following the curve of the superior margin; apical pegs longest, subulate, the series regularly decreasing in size backwards; posterior teeth short, sub-ovate; intermediate claws about as long as tarsi. Length, 7 mm.

♀ A little larger than the male. Frontal margin of head somewhat angularly rounded; interocular carina continued below on to face, which is convex, punctured, and clothed with pale yellow hairs. Palae falcate, upper edge very convex. Underside of abdomen ochraceous, darkened marginally. In two examples from Murray River the head is dark castaneous. Length, 7.5 mm. to 8 mm.

Hab. South Australia: Adelaide (A. H. Elston and H. M. Hale), Murray River (J. G. O. Tepper and H. M. Hale), Goolwa and Finniss River (A. Zietz); Victoria: Port Phillip (type locality); Tasmania (British Museum).

A. australis is so far recorded from southern Australia and Tasmania only. The female has not previously been described.

ARCTOCORISA TRUNCATIPALA sp. nov.

♂ Head testaceous, a little longer than its width, evenly rounded in front; a longitudinal, median carina, slightly and angularly produced at basal margin

(6) Skuse, Rec. Aust. Mus., ii, 1893, p. 43.

of head; an impressed line of punctures on each side of carina and another bordering the eye; facial impression obovate, very large and deep, extending almost to the vertex and laterally nearly touching the eyes; eyes directed moderately backwards, beyond and over the anterior pronotal angles, inner

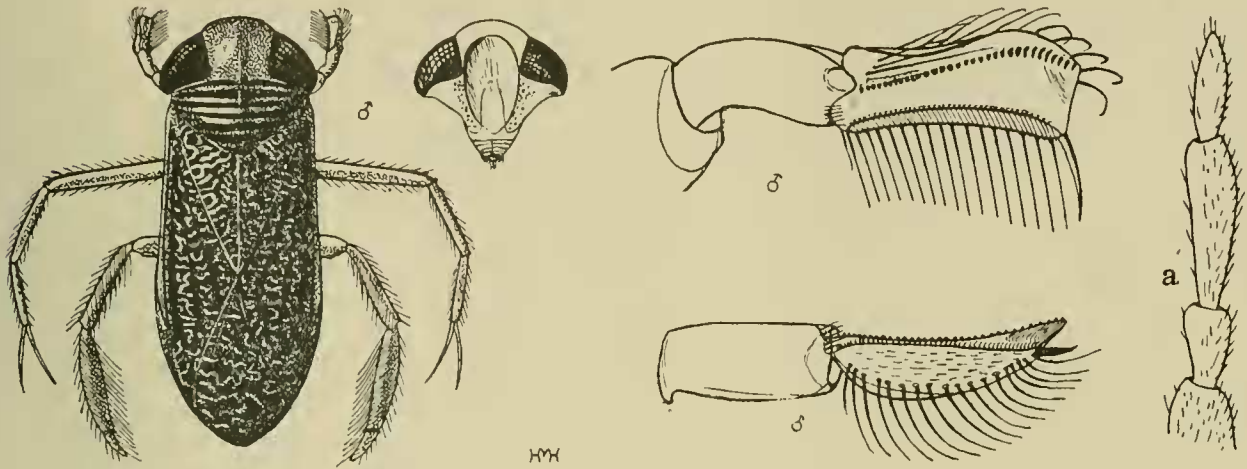


Fig. 341. *Arctocoris truncatipala*.

margins slightly divergent; fourth joint of antennae more than half as long as the third (a). Pronotum black, crossed by six, slightly curved, greenish-yellow lines; twice as broad between humeral angles as medial length; rastrate and with a median carina, most distinct anteriorly; posterior margin angularly convex; lateral margins short; angles obtuse. Hemelytra black, marked with yellow, sparsely clothed with long, fine, yellow hairs; clavus finely rastrate, basally with five or six narrow, irregular, obliquely-transverse lines; remainder of wing-covers with many short, angularly wavy markings, on the corium arranged in four distinct longitudinal series, the outer series forming an interrupted line bordering the anterior margin, but separated from it by a narrow black interspace; tip of membrane black; embolium dull, livid. Sternum and legs ochraceous; underside of abdomen testaceous; connexivum pale yellow; strigil brownish black, of comparatively large size, sub-quadrate in form, with five broad, more or less regular rows of striae; anterior tibiae stout, about four-fifths as long as palae which, viewed from above, are semi-lunate, narrower at the base; seen sideways they are elongate sub-rectangular, the apex very truncate, as wide as the base and forming a wide angle with the upper and lower edges; base slightly widened; upper edge posteriorly almost straight, a little concave, suddenly convex and bent downwards to the upper apical angle; lower edge gently concave; claw as long as the width of tarsus; thirty-two stridulatory pegs in a single row sub-parallel with the upper margin, extending from the middle of the base to the upper anterior angle; apical pegs longest, subulate, the series regularly decreasing in size backwards, the posterior teeth being stout and sub-oval; intermediate claws about

equal in length to tarsi; tibiae longer; posterior tibiae shorter than tarsi; swimming hairs dark brown. Length, 5.8 mm. to 6.5 mm.

♀ More robust than the male. Head slightly shorter, the frontal margin somewhat angularly rounded; interocular carina extending below on to the face, which is convex, punctured, and with sparse yellow hairs. Palae much as in the female of *A. australis*. Length, 5.8 mm. to 7 mm.

Hab. South Australia: Adelaide (type locality, H. M. Hale, A. H. Elston, and Mulvin), Murray River (H. M. Hale), South East (Ziegler), Lucindale (B. A. Feuerheerdt), Myponga (A. H. Elston), Goolwa and Finniss River (A. Zietz); New South Wales: Sydney (Australian Museum), Bungendore, Clarence River, and Hay (A. M. Lea); Victoria: Melbourne (Searle); Tasmania: (A. Simson), Hobart (A. M. Lea). Type, I. 15183.

A. truncatipala is allied to the preceding species, but the form is more robust and the head is scarcely as prominent; the pronotal lines are broader and usually in less number, and the hemelytral markings are more broken. It may be readily recognized by the form of the male pala, which does not taper to a point, but terminates in a straight, knife-like edge; this pala is figured as seen sideways and from beneath. In a large series the following variations occur: Six to eight transverse lines on the pronotum, generally regular, but sometimes forked, looped or conjoined; the former number is more usually present. Thirty-two to thirty-five pegs in the palal comb. The intermediate claws vary in length and may be as long as the tibiae. The sternum is sometimes nigrescent and the xyphus and coxae black.

The species is plentiful in the rivers near Adelaide during the summer. Pupae and immature imagoes are of bright lemon colour with very faint markings, which rapidly darken as development proceeds; an orange streak margins the base of the head. The light lines and vermiculations of a living mature example are barely discernible to the naked eye, the bug appearing almost black.

ARCTOCORISA SUBLAEVIFRONS sp. nov.

♂ Head ochraceous, basally testaceous, about as long as width at base between eyes, rounded and very little produced in front; with a median, interocular carina, slightly produced at hinder margin of head; an impressed line of punctures on each side of the carina and another less distinct series near each eye; face flattened, punctured; impression hardly discernible, closely punctured, clothed with yellow hairs; very shallow, short, and narrowly ovate; eyes directed backwards, beyond and over the anterior pronotal angles, the inner margins a little divergent. Pronotum brownish-black, crossed by eight narrow irregular,

yellow lines; nearly twice as broad between humeral angles as medial length; rastrate, and with a median carina, most distinct anteriorly; posterior margin angularly convex; lateral margins short; angles roundly obtuse. Hemelytra brownish-black, marked with yellow, with a few fine yellow hairs; sutures margined with yellow; clavus with oblique, sub-transverse, angularly-wavy lines, rastrate; corium with fragmentary wavy lines, arranged in four rather ill-defined longitudinal series; markings on membrane transverse anteriorly, sub-parallel on inner margin and twisted on the disc; embolium pale yellow. Sternum and legs ochraceous; underside of abdomen pale testaceous; strigil dark brown, large, roundly sub-quadrate, with six rows of striae; anterior tibiae stout; palae cultrate,

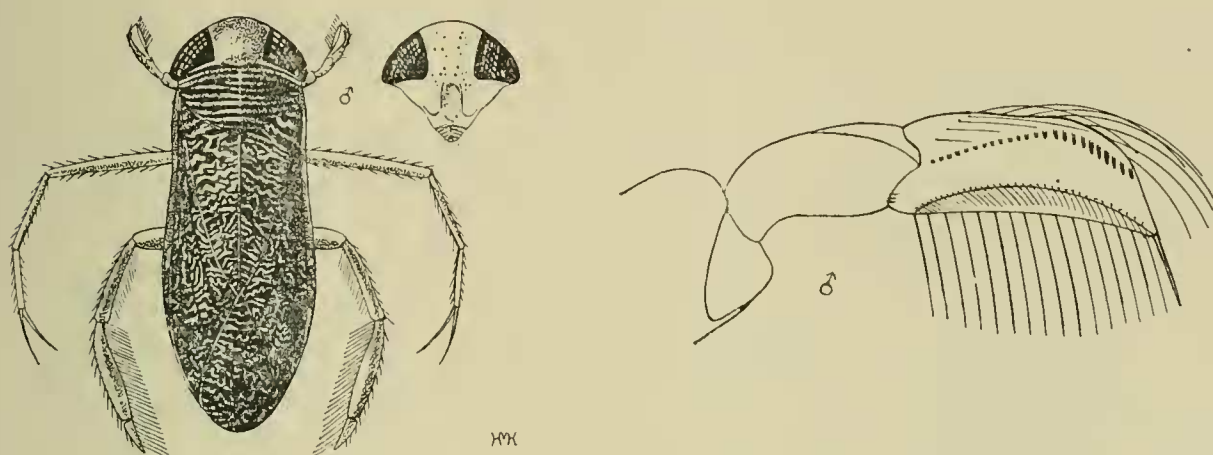


Fig. 342. *Arctocoris sublaevifrons*.

sub-truncate, narrowest at base; upper margin almost straight, slightly sinuate, and anteriorly suddenly bent obliquely downwards and forwards to apex; claw rather weak; twenty-four short stridulatory pegs in a single row sub-parallel to the superior margin, not reaching to apex; anterior pegs longest, the series regularly decreasing in size backwards; intermediate claws as long as the tarsi. Length, 6 mm.

♀ Slightly larger and more robust than the male. Palae as in female of *A. australis*, but head shorter.

Hab. Victoria: Coromby (type locality, J. G. O. Tepper), Melbourne and Plenty River (Searle), Croydon, Gumbower, and Mount Macedon (National Museum). Type, I. 15184.

The variation is as follows: Pronotal lines seven to eight; palal pegs twenty-one to twenty-four.

Like *A. australis*, this species is of elongate form, but the head is less produced in front. The male differs in the slight facial impression and lesser number of palal pegs.

POROCORIXA subg. nov.

Pronotum and hemelytra densely punctate, clothed with short hairs; pronotum without transverse lines; no vermiculate or angulate markings on wing-covers. Male with facial impression, and a strigil on right side of abdomen; face of female convex. Pala with a terminal claw, pegs of stridulatory comb strong.

Type, *Corixa eurynome* Kirkaldy.

Resembles the African *Agraptocorixa* Kirkaldy, but in that genus the pronotum is lightly punctate-rugose and no mention is made of punctation on the hemelytra.

POROCORIXA EURYNOME Kirkaldy.

Corixa eurynome Kirk., Ann. Mag. Nat. Hist. (6), xx, 1897, p. 54.

♂ Head ochraceous or testaceous, about as long as wide, a little tumid in front, almost evenly concave posteriorly; with a coarse, median longitudinal, interocular carina, on each side of which is an impressed line of punctures, closely

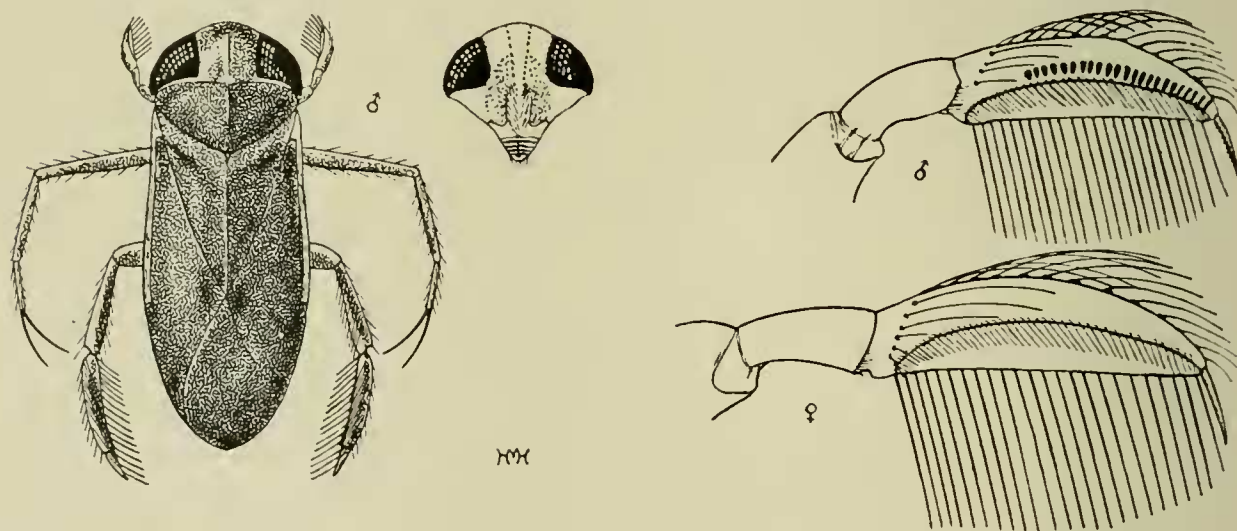


Fig. 343. *Porocorixa eurynome*.

set posteriorly, but becoming more scattered towards the vertex; another line of punctures near each eye, curved inwards near base of head to meet the first series; face ochraceous, punctate, clothed with fine yellow hairs; with a slight depression extending to well above inner margins of eyes, and a shallow, rather narrow, obovate, interior impression reaching to between inner angles of eyes; eyes directed backwards, a little beyond and over the anterior pronotal angles, the inner margins almost parallel, slightly divergent; terminal joint of antennae very short. Pronotum dark olivaceous-brown (appearing almost black in fresh adult examples), clothed with very short black hairs; twice as broad between humeral

angles as medial length, with comparatively large, crowded punctures, almost confluent; anterior margin medianly incised; posterior margin angularly convex; lateral margins short, oblique; angles subacute. Hemelytra dark olivaceous-brown, paler basally; with closely-set punctures as on pronotum, but with longer black hairs; clavus with a short, dark streak near lateral basal angle, sub-parallel with the suture, and a dark marking at the inner and apical angles; claval suture narrowly margined with black; corium darkened at angles and opposite the termination of the embolium, which is pale. Sternum ochraceous; underside of abdomen black anteriorly, testaceous posteriorly, clothed with a very fine, pale pubescence; connexivum testaceous; strigil very small, roundly sub-quadrate, with four broad rows of striae; legs ochraceous, tibiae and tarsi more or less darkened; anterior tibiae about half as long as the palae, which are falcate, evenly rounded above, narrower at the base; claw strong, the inner edge serrate; a single row of about twenty-three stridulatory pegs, following the curve of the lower margin and extending from the apex to three-fourths of the length; apical pegs long, acute, the remainder sub-oval, pointed; intermediate claws as long as, or a little longer than the tarsi, which are little more than half the length of the tibiae; first joint of posterior tarsi as long as the tibiae; swimming hairs black. Length, 8.5 mm. to 9 mm.

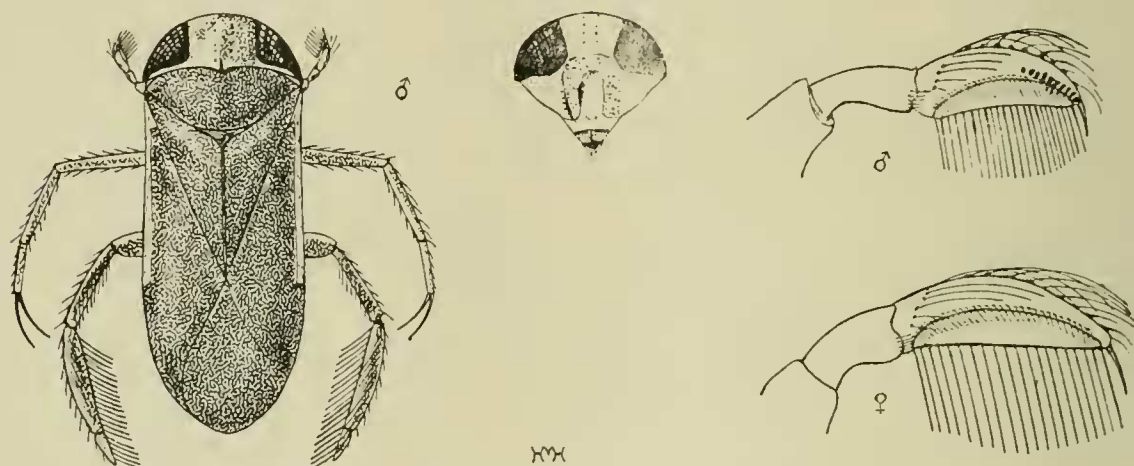
♀ Interocular carina, and punctures on head and face, as in male; the slightly depressed area on the face is somewhat raised centrally; face testaceous, with yellow hairs. Underside of abdomen testaceous, posterior segments sometimes darkened; palae relatively longer, but more slender, than in male; claw apparently not serrate. Length, 9 mm.

Hab. South Australia: Adelaide (J. G. O. Tepper and H. M. Hale), Murray River and Bordertown (J. G. O. Tepper), Blakiston (Driffield); Queensland: Townsville (F. P. Dodd); New South Wales: Mittagong and Clarence River (A. M. Lea); Victoria: (Blackburn), Plenty River (Searle), Mallee (National Museum, and O. Donohue).

It is with some doubt that specimens from the above localities are referred to this species. The author describes the hemelytra as "paler at the base (owing to absence of punctuation)"; in examples now identified the punctures extend over the whole of the wing-covers, excepting the very small, dull, blackish portion which is covered by the pronotum. Both sexes have a longitudinal, median carina on the head, a character assigned only to the female in the original description; the facial impression of the male does not extend "almost to the vertex," and the clothing is dark. The type is from Adelaide River, Northern Territory (British Museum).

POROCORIXA PARVIPUNCTATA sp. nov.

♂ Head pale ochraceous, wider than long, almost straight in front, scarcely produced in front of eyes; posterior margin sinuate, medianly angular; crown not conspicuously convex, with a very indistinct interocular carina; a line of small punctures on each side of the median line of the head and another series bordering the inner margin of each eye and bent inwards near the base of the head; face with a punctate, shallow, obovate depression reaching to just above inner angles of the eyes; a small, narrow, interior impression, reaching to between inner angles of eyes; eyes directed moderately backwards, inner margins parallel above, converging on face. Pronotum olivaceous-brown, in parts diluted, clothed with short black hairs, more than twice as broad between humeral angles as medial length; punctures minute, confluent, and forming fine, transverse wrinkles; a

Fig. 344. *Porocorixa parvipunctata*.

feeble median, longitudinal ridge; anterior margin convex, slightly incised medianly; posterior margin sinuately convex; lateral margins very oblique; angles very acute. Hemelytra dark olivaceous-grey, in parts darkened, finely punctured and with black hairs; clavus testaceous basally and darker at angles; corium darkened anteriorly, at apex and below termination of the embolium, which is pale livid with the outer margin black. Sternum pale ochraceous; underside of abdomen dark testaceous, clothed with a fine, yellow pubescence; connexivum yellow, in parts black; strigil black, very small, roundly sub-triangular, with two broad rows of striae; legs testaceous; anterior tibiae more than half as long as palae, which are falcate, evenly convex above, narrower at the base; claw rather short; one short row of ten stridulatory pegs, situated on the apical third of the tarsus; middle pegs longest and stoutest, posterior four conspicuously shorter; intermediate tarsi more than half as long as tibiae, about as long as claws; posterior tarsi longer than tibiae; swimming hairs brown. Length, 6 mm.

♀ Head darkly suffused at base, shorter than in the male; face furnished with yellow hairs; convex, finely punctured. Underside of abdomen testaceous, posterior segments sometimes darkened. Anterior tibiae relatively shorter, and palae longer and narrower than in male. Length, 6 mm. to 7 mm.

Hab. South Australia: Adelaide (type locality, H. M. Hale), Mount Lofty Ranges (S. H. Curnow), Reynella (G. Dutton), Murray River (H. S. Cope and H. M. Hale), Bordertown (J. G. O. Tepper), Myponga and Barossa (A. H. Elston), Northern Flinders Ranges (A. H. Elston and H. M. Hale); Central Australia: Opossum Creek ("W. H.," Horn Expedition, 1896), Higgin's Dam (South Australian Museum Expedition, 1916); Queensland: Claudie River, N.Q. (J. A. Kershaw), Longreach (A. M. Lea), Charters Towers (Mrs. Black); New South Wales: Broken Hill (F. W. Shepherd), Bungendore and Hay (A. M. Lea), Wagga and Tamworth (W. W. Froggatt); Victoria: Dimboola (J. G. O. Tepper), Melbourne, Plenty River and Wattle Park, Balwyn (Searle); Tasmania: Hobart (A. M. Lea). Type, I. 15185.

This widely distributed species somewhat resembles *P. eurynome*, but is of smaller size and more finely punctured. The head is shorter and less produced in front; the basal margin is more angulated in the middle, so that the posterior angles of the eyes are farther from the margin. The facial impression of the male is less distinct and there are only ten or eleven palal pegs.

During life the head is bent down rather more than is shown in the figure, and seen from above appears much wider than its length; the eyes are wine red.

POROCORIXA HIRTIFRONS sp. nov.

♂ Head ochraceous, distinctly longer than its width at base between eyes, slightly shorter than the pronotum; a little produced in front of eyes; posterior

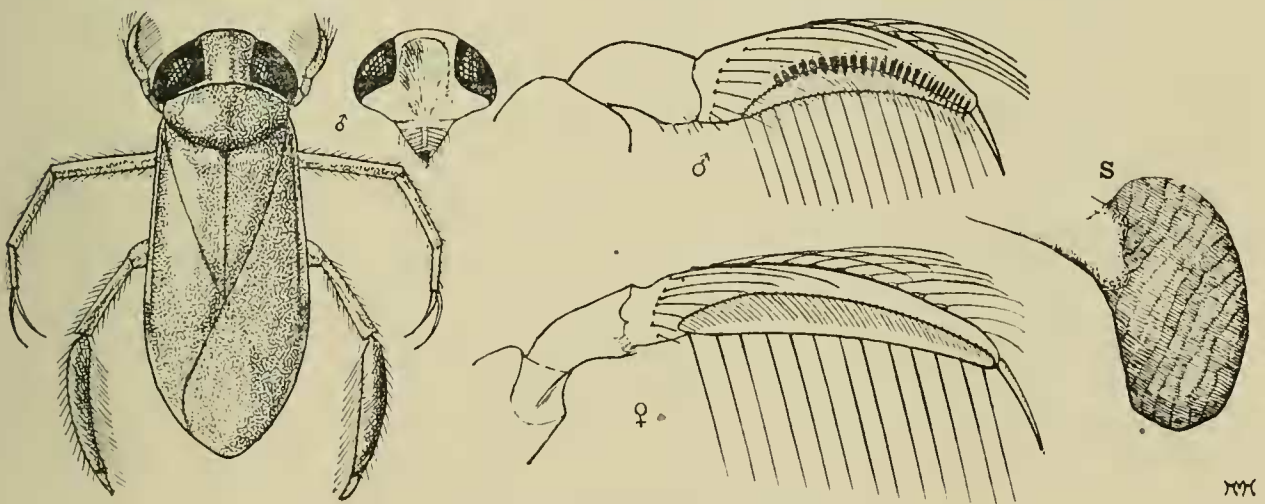


Fig. 345. *Porocorixa hirtifrons*.

margin medianly angular; a longitudinal, interocular carina, dilated anteriorly, with an indistinct line of punctures on each side and another bordering the inner margin of each eye, curved inwards above an indentation next to each posterior angle; face densely covered with long, yellow hairs; impression very large and deep, broadly obovate, extending practically to the vertex and laterally almost touching the inner margins of the eyes; eyes directed moderately backwards, projecting beyond the anterior pronotal angles; inner margins diverging above, parallel on the face. Pronotum ochraceous, posteriorly narrowly margined with castaneous, clothed with a distinct, golden pubescence; about twice as broad between humeral angles as medial length, narrower than the head; punctures small, confluent, presenting an appearance of impressed, irregular lines; an obsolete median carina; anterior margin rounded, very slightly medianly incised; posterior margin evenly rounded; lateral margins moderately short, a little oblique; angles roundly obtuse. Hemelytra pale ochraceous, clothed with golden hairs; punctures dark, small and more or less confluent; inner margin of clavus paler; claval suture and outer edge of corium narrowly margined with castaneous; embolium whitish. Underside and legs stramineous; connexivum yellow; strigil(s) dark brown, very large, nearly 0.5 mm. in length; suboval, with about twelve rather irregular rows of striae; anterior tibiae stout, less than half as long as the palae, which are long, narrowly falcate, widest near the base; claw long and strong; twenty-five stridulatory pegs in a single row placed near, and following the curve of, the lower margin, not extending to the base; pegs regularly decreasing in length backwards, anteriorly triangular, pointed, thinner than, and about twice as long as, the posterior ones, which are stout suboval and pointed; intermediate tarsi a little more than half as long as tibiae, about as long as claws; posterior tarsi wide, longer than tibiae; swimming hairs brown. Length, 8 mm.

♀ Head a little shorter and wider; face slightly convex, densely clothed with golden hairs, punctured. Posterior margin of pronotum more widely edged with castaneous. Palae longer, narrower, and less curved. Length, 8 mm.

Hab. South Australia (Rev. A. P. Burgess); Central Australia: Cooper Creek (type locality, J. G. Reuter); Queensland: Cunnamulla (H. Hardecastle). Type, 1. 15186.

The almost elliptical pronotum is furnished with longer and paler hairs, and the strigil is very much larger, than in either of the two preceding species. A more elongate form and lighter colouration, the large, densely clothed facial impression and the palae afford further distinguishing characters.

In the single imperfect example from Queensland the pronotum is light olivaceous in colour,

MICRONECTA Kirkaldy.

Micronecta Kirk., Entomologist, 1897, p. 260.

Sigara Fabr., Ent. Syst., iv, 1794, p. 59 (part), and Syst. Rhyng., 1803, p. 104 (part).

Type, *M. minutissima* Linnaeus.

The members of this cosmopolitan genus are all of small size; none is over 5 mm. in length, most are considerably smaller. The antennae are three-jointed (fig. 346a), the face is convex in both sexes, and the asymmetry is to the right in the male. Three species have been recorded from Australia by Kirkaldy, but these have not been recognized amongst the material now dealt with. As I have not had opportunity of examining the types, the author's descriptions are quoted verbatim. In this, or indeed any other group of small insects in which specific differences are comparatively slight, it is advisable, if not absolutely necessary, that descriptions should be accompanied by figures.

MICRONECTA BATILLA sp. nov.

♂ Head pale ochraceous, with a large, sub-circular marking (of darker colour anteriorly) which almost touches the eyes and reaches just beyond the vertex; a dark orange median, longitudinal line; posterior margin darkly suffused and with a black, central tubercle; long, prominent, much produced in front of eyes, about one and one-half times as long as the pronotum, its length greater than width at base between eyes, the inner margins of which are divergent, the interocular width anteriorly being greater than the length of the head. Pronotum pale olive green, with a faint, smoky-brown, horizontal fascia, which is interrupted in the middle and does not reach the lateral edges; almost elliptical, short, three and one-half times as broad between humeral angles as medial length; rather rugose, with irregular, transverse, punctured striae; lateral margins extremely short. Scutellum pale olive green, transversely wrinkled. Hemelytra of like colour, apically pitchy, basally paler; densely punctured, costal margins pale

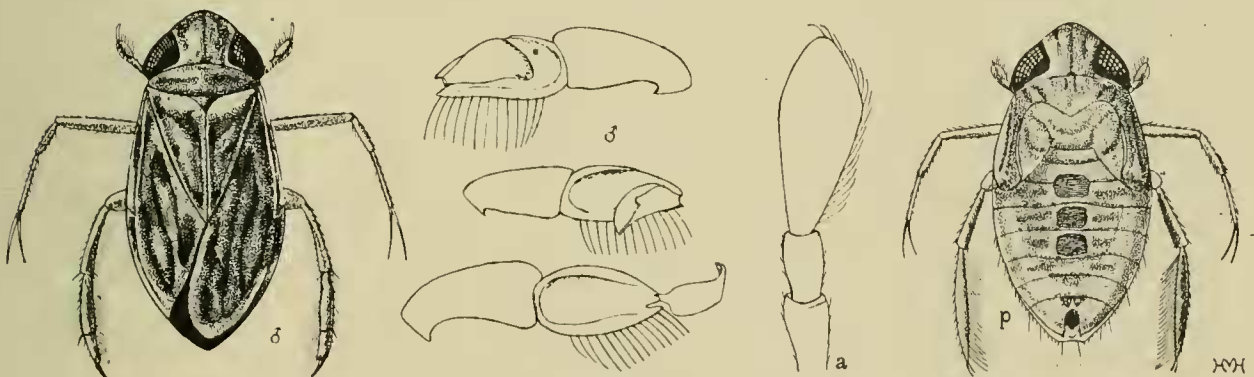


Fig. 346. *Micronecta batilla*.

with two dark streaks; clavus with pitchy, fasciate lines, sub-marginal to the edges, widened and darkened basally, and in a lesser degree medianly and apically; claval suture black; corium with four somewhat interrupted, blackish lines of varying thickness, lateral margin anteriorly pale ochraceous; apex of membrane roundly angulate. Sternum ochraceous; underside of abdomen pitchy, in parts ochraceous; legs pale ochraceous, in parts infuscated with orange; intermediate claws a little shorter than tarsi, which are darker at the tips. Length, 2.75 mm. to 4.5 mm.

♀ A little more robust. Underside pale ochraceous. Length, 3 mm. to 5 mm.

Hab. South Australia: Adelaide (H. M. Hale), Mount Lofty Ranges (type locality, H. M. Hale, Driffield, J. Formby, and Dr. L. Richter), Myponga (R. F. Kemp), Goolwa (A. Zietz), Yacka (A. H. Elston); Queensland: Gladstone (A. M. Lea); New South Wales: Coolabah (W. W. Froggatt), Hay (A. M. Lea); Victoria: Melbourne (Searle), Lake Hattah (J. E. Dixon). Type, I. 15187.

This species is variable in colour and in size, but in a series of specimens from any one locality these characters are fairly constant. The pronotum is sometimes smooth, and may be unicolorous or with faint indications of a transverse fascia; sometimes it is piceous, with the anterior and posterior edges and a longitudinal, median line of light colour; in a few examples the posterior margin only is pale. The base of the hemelytra is not always paler. Specimens from the Adelaide plains are dark olivaceous-brown, with the orange marking on the head indistinct. A single male from Queensland is fuscous with castaneous markings. Another colour variety is castaneous above, with the hemelytral markings extremely faint or absent, and the sutures and outer margin of the clavus narrowly edged with castaneous.

In the figures of the male palae, the large flattened claw is shown in various positions: this claw is hinged in a nick at the apex of the tarsus, and when folded back rests in a depression on the upper side of the joint.

Life colours. In parts the colours of a freshly-killed specimen rapidly alter as the insect dries; the life colouration of Adelaide specimens is as follows:

♂ Head pale, with a large, brownish-orange, sub-circular marking, within which are two U-shaped, bluish-green markings; blackly suffused at base; face cyaneous, paler centrally; eyes black. Pronotum, scutellum and hemelytra as previously described. Sternum pale, in parts greenish; xyphus green; underside of abdomen pitchy, paler posteriorly and on lateral edges; legs testaceous, in parts diaphanous; posterior half of intermediate femora sometimes pale blue.

♀ Underside of abdomen bluish-green.

The male is easily distinguishable by the pitchy abdomen.

In autumn (April and May) of 1921 this species was common in the Torrens River at Adelaide, at which time the water was at a comparatively low level; larvae and pupae (p), as well as imago, were present in considerable numbers. In August of the same year, when the river had again somewhat subsided after the winter rains, hundreds of specimens were taken, all being fully adult. Mud adhered plentifully to the backs of very many of them, and in one instance a branched alga was attached to and growing profusely on the wing covers of the living bug. Epiphytic diatoms were associated with the alga, which was determined by Mr. L. J. Millar as a species of *Cladophora*, which has also been taken from the carapaces of Murray River tortoises. The presence of mud and living vegetation indicates that the insects are dormant during the winter. J. W. Douglas⁽⁷⁾ observed English *Corixae* in the spring besmeared with mud, and suggests that the bugs are buried in the river-bed throughout the winter months. If, however, they merely remained inactive and clinging to weeds and stones, they would become similarly coated, for sediment would deposit evenly on the head, pronotum, and hemelytra.

MICRONECTA ROBUSTA sp. nov.

♂ Head greenish ochraceous, with a longitudinal, median testaceous line; hinder margin darkened and with a central, dark brown tubercle; length little more than half the width at base between eyes, rather shorter than the pronotum. Pronotum dark greyish-brown; width between humeral angles much more than twice medial length; shining, smooth, except for very faint transverse scratches; lateral margins a little oblique; angles obtuse. Scutellum testaceous. Hemelytra greyish-brown, paler at base, darkened apically; punctured; costal margins ochraceous, with two linear, blackish markings; clavus with somewhat broken

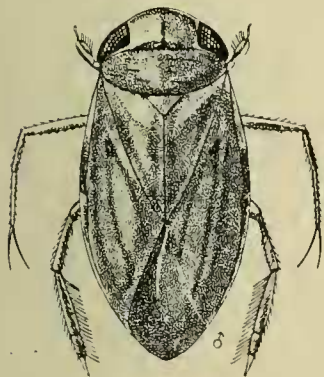


Fig. 347.
Micronecta robusta.

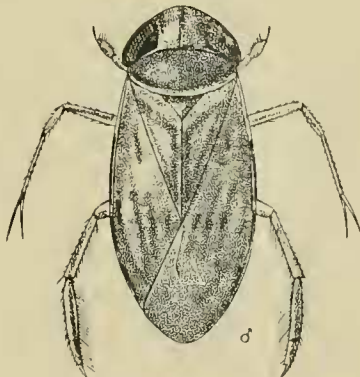


Fig. 348.
Micronecta gracilis.

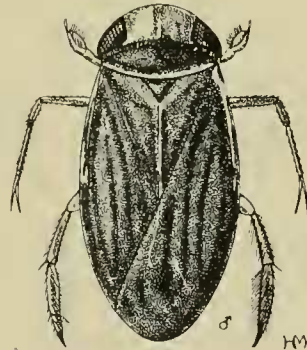


Fig. 349.
Micronecta virgata.

(7) Douglas, Ent. Month. Mag., iii, 1866, p. 27.

fasciate markings, parallel to margins; claval suture edged with ochraceous; corium with three or four more or less interrupted, dark, fasciate markings; outer edge ochraceous; apex of membrane roundly angulate. Sternum and legs ochraceous; underside of abdomen testaceous; intermediate claws as long as tarsi. Length, 3.75 mm. to 4 mm.

♀ Larger and more robust. Head rather shorter and wider; face centrally testaceous. Legs and underside wholly ochraceous or with posterior coxae darkened. Length, 4 mm.

Hab. South Australia: Adelaide (type locality, H. M. Hale), Quorn (A. H. Elston), Murray River (H. S. Cope and F. R. Zietz), Mount Lofty Ranges (J. Formby); Western Australia: Mullewa (Miss J. F. May); New South Wales: Coolabah (W. W. Froggatt). Type, I. 15188.

The head in drying sometimes assumes a more angularly rounded appearance in front of the eyes; the longitudinal, median line may be darkened and diffused. The pronotum may be unicolorous or posteriorly margined with ochraceous. A colour variety from Mylor, Mount Lofty Ranges, is pale ashen-grey, with brown markings.

MICRONECTA GRACILIS sp. nov.

♂ Head ochraceous, in parts darker; with a median, longitudinal, testaceous marking; posterior margin suffused with fuscous and with a small, central tubercle; rather long, well produced in front of eyes, about as long as the pronotum, almost as long as width at base between eyes, the inner margins of which are divergent. Pronotum dark castaneous, the posterior margin narrowly edged with paler; large, nearly twice as broad between humeral angles as medial length; shining, almost smooth, with very faint, transverse scratches; lateral margins short, oblique; angles sub-acute. Scutellum fuscous. Hemelytra pale fuscous, paler basally and on the costal edge; the last-named with three linear brown streaks; densely punctured; clavus with pale castaneous fasciate markings sub-parallel to the margins; corium with four obscure, broken, longitudinal, dark streaks. Underside ochraceous, in parts marked with fuscous; legs pale ochraceous. Length, 3.5 mm. to 4 mm.

♀ Underside ochraceous. Length, 3.5 mm. to 4 mm.

Hab. South Australia: Adelaide and Murray River (H. M. Hale), Quorn (type locality), and Myponga (A. H. Elston), Mount Painter, Flinders Ranges (H. G. Stokes); Queensland: Dalby (Mrs. F. H. Hobler); New South Wales: Tamworth (A. M. Lea); Victoria: Melbourne and Wattle Park, Balwyn (Searle), Coromby (J. G. O. Tepper). Type, I. 15189.

Differs from other species here described in the more slender form and comparatively long pronotum; the hemelytral markings are always broken; the pronotum is sometimes unicolorous.

Several examples from Cairns district, Queensland (A. M. Lea) are much smaller in size, all being less than 3 mm. in length; these possibly represent a local variety.

MICRONECTA ERATO Kirkaldy.

Micronecta erato Kirk., Ent. News (Philadelphia), xvi, 1905, p. 263.

“Head and underside pale stramineous. Pronotum pale sordid yellow, with a broad blackish brown median transverse stripe, which does not reach the lateral margins. Tegmina sordid stramineous; clavus with two dark brown narrow lines running parallel to interior and corial margins, uniting at the apex of clavus. Corium with two elongate, suboval areas narrowly dark brown bordered, and the exterior lateral margins also brownish black. Pronotum, scutellum, and tegmina somewhat superficially punctured. Head rounded in front, longer than the pronotum; lateral margins of pronotum obsolescent; membrane apically angulate. Length, about 3 mm. Australia: Victoria.”

Type in author's collection.

MICRONECTA VIRGATA sp. nov.

♂ Head testaceous, posterior margin with a small, central, black tubercle; short and but little produced in front of eyes, about as long as the pronotum, its length a little more than half the width at base between eyes, which are very slightly divergent. Pronotum dark brown, posteriorly narrowly margined with ochraceous; shining, about three times as wide between humeral angles as medial length; anterior margin sinuate; lateral margins short; angles obtuse. Scutellum fuscous. Hemelytra testaceous, punctured, paler basally; costal margin with a linear black marking, interrupted in the middle; two distinct, pitchy-brown fasciate lines sub-marginal to the inner and outer edges of the clavus and four longitudinal ones on the corium; membrane with some dark spots. Underside and legs testaceous. Length, 3 mm. to 3.5 mm.

♀ Head, underside, and legs ochraceous. Length, 3.5 mm. to 4 mm.

Hab. Queensland: Townsville (type locality, G. F. Hill), Cairns district (A. M. Lea). Type, I. 15190.

The pronotum in some instances is not posteriorly margined with ochraceous.

MICRONECTA ANNAE Kirkaldy.

Micronecta annae Kirk., Ent. News (Philadelphia), xvi, 1905, p. 262.

“Head pallid. Pronotum dark fuscous brown, with darker transverse

median line. Tegmina fuscous brown (the margins of the areas narrowly darker), somewhat superficially punctured. Head a little longer than the pronotum, rounded in front. Pronotum elongate elliptical, lateral margins very short, much less than half the width of the posterior margin of an eye. Mesoxypus acutely triangular. Terminal segment of antenna elongate, somewhat thickened. Intermediate femur equal in length to the tibiae, tarsus, and claw together; tarsus one-half longer than a claw, which is equal in length to the tibia. Subcostal furrow much as in *M. vanduzeei*. Length, 3¼ mm. Australia."

Type in author's collection.

MICRONECTA ANNAE Kirk., var. PALLIDA Kirk.

Micronecta annae Kirk., var. *pallida* Kirk., P.L.S., N.S. Wales, xxxii, 1908, p. 788.

"No transverse line on pronotum: tegmina with a pale castaneous basal band. Hab. Q.: Kuranda (Aug.; Perkins)."

The characters constituting the varietal diagnosis as given by the author are variable in some other of the species examined by me; the distinction of a "variety" on such foundation alone is somewhat doubtful.

MICRONECTA MICRA Kirkaldy.

Micronecta micra Kirk., P.L.S., N.S. Wales, xxxii, 1908, p. 788.

"Pale brown, brownish-testaceous beneath; a pale castaneous band at the base of the tegmina, lateral margins with one or two dark specks. Abdomen above partly dark. Head well rounded in front of eyes, which are practically contiguous with the corium. Pronotum very short, narrower than the head, *hind margin truncate*. Length, 2 mill. Hab. Q.: Kuranda (Aug.; Perkins)."

The main distinguishing feature of this small species appears to be the short, narrow, and posteriorly truncated pronotum.

DIAPREPOCORIS Kirkaldy.

Diaprepocoris Kirk., Ann. Mag. Nat. Hist. (6), xx, 1897, p. 52.

Type, *D. barycephala* Kirk.

This monotypic genus was founded upon female specimens. The palae, which are similar in both sexes, are "bisegmentate," the terminal joint having the form of a strong claw. Kirkaldy remarks that the "second segment appears to be a genuine second tarsal segment, not a single claw." The abdominal segments of the male are not disordered to the same extent as in other genera of Corixidae, and the asymmetry is not evident on the underside. The antennae are four-jointed (fig. 350a), and neither sex has a facial impression.

DIAPREPOCORIS BARYCEPHALA Kirkaldy.

Diaprepocoris barycephala Kirk., Ann. Mag. Nat. Hist. (6), xx, 1897, p. 53.

♂ Head flavous or ochraceous, a black dot often present on each side; prominent, produced in front of eyes and a little longer than its width at base between eyes; hinder margin almost evenly concave, dark testaceous centrally; face convex, with a broad, median carina; inner margins of eyes sometimes nearly parallel, sometimes considerably divergent. Pronotum testaceous or brownish-black, sometimes darkened posteriorly or anteriorly; laterally and where covered by head, pale; about four to six times as wide as long, finely rugose; anterior margin sinuate. Scutellum black, laterally testaceous; or flavescent, varyingly stained with testaceous or black; longer than wide, about as long as head and pronotum together. Hemelytra sordid yellow, in parts infuscated; embolium wholly luteous or black on inner half. Scutellum and hemelytra clothed with short, black pubescence. Posterior dorsal segments of abdomen slightly asymmetric, with a comparatively large stridulatory apparatus to the right of the midline of the body (s); stridulator brownish-black, basally overlapped by the

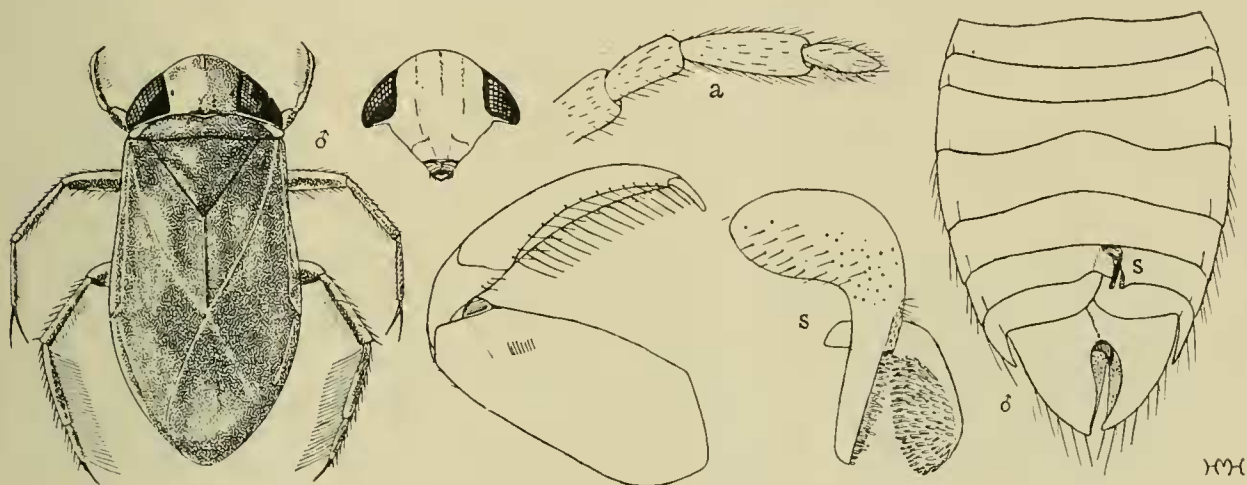


Fig. 350. *Diaprepocoris barycephala*.

fifth segment; stridulatory area black, situated on the sixth segment. Legs pale testaceous or flavous; palae sub-lunate, second joint very short, sub-cylindrical, slightly curved and tapering, rounded at the apex; anterior tibiae closely embracing base of palae; intermediate tibiae a little longer than tarsi; claws shorter. Length, 7 mm. to 7.5 mm.

♀ More robust than the male. Length. (6.2 mm.) to 8 mm.

Hab. South Australia: Adelaide (A. H. Elston and H. M. Hale), Lucindale (B. A. Feuerheerdt), Lake Alexandrina and Goolwa (A. Zietz), Murray Bridge (F. R. Zietz); "Victoria" and "Tasmania" (British Museum).

The colour is variable, some specimens being pale, while in others the infus-

cation is so marked that the insects appear almost uniformly dull black above; the wing-covers are semi-transparent, and the dark appearance is largely due to the nigrescent upper-surface of the abdomen, jet black in mature adults. Sometimes the whole underside, including the coxae, is black, only the face and other leg-joints being yellow.

There seems to be little doubt that the abdominal attachments referred to constitute a stridulatory apparatus. There are two hard, chitinous parts, a movable agent or stridulator, and a passive toothed area which is fixed to the sixth segment. The base of the stridulator is much expanded and flattened, forming a large lateral lobe. This is attached to the membrane beneath the fifth segment, which more or less covers the lobe, but is not connected with it. The free portion is almost straight, sub-cylindrical, and rounded apically; the right side is somewhat flattened and furnished with long, blunt, and slightly curved pegs, as is also the sub-circular stridulatory area immediately opposite; in the figure both surfaces are shown turned a little towards the observer.

It is not yet known whether these parts are operated while the insect is submerged or only when the wings are spread.

The smaller measurement of the female (6.2 mm.) is that given by Kirkaldy; the specimens examined by him may have included both sexes, but the male may not have been recognized, as the ventral segments of the abdomen differ but slightly.